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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/670,189	09/26/2000	Gary Eugene Wheat	13DV13658	5616

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EXAMINER
CLEVELAND, MICHAEL B

ART UNIT	PAPER NUMBER
1762	6

DATE MAILED: 04/15/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

MF4

Office Action Summary	Application No.	Applicant(s)	
	09/670,189	WHEAT ET AL.	
	Examiner	Art Unit	
	Michael Cleveland	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 September 2000* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The phrases "a coating source" and "contacting" are unclear based on the totality of the claims because the independent claims make it appear that the "coating source" is a gas (because of the inclusion of the "carrier gas"), but the dependent claims (e.g., claim 6) require that at least part of the source is solid and because the dependent claims make it appear that the phrase "contacting the coating source to the article" includes both keeping the coating source and surface separate, as in claim 8 (which appears to be repugnant to both the term "separated" and "contacting") and applying the source to the surface, as in claim 9 (which does not appear to further limit the parent claim). For purposes of applying art, claims 8 and 19 were treated as inclusive of instants in which the coating source is provided, but has not yet reached the surface of the article to be coated.

Claim 3: The term "nickel-base" is unclear because it is not clear what the basis is. Applicant provides examples of "nickel-base" alloys on p. 6. However, it is clear that the term is broader than those examples. Accordingly, the scope of the claim is not clear. For purposes of applying art, the examiner treated the term as inclusive of the exemplary compositions described on p. 6 and inclusive of anything specifically identified by the prior art as "nickel-base" or "nickel-based".

Claims 7 and 18: The term "the elemental solid modifying element" lacks proper antecedent basis because no elemental solid modifying element is mentioned in the parent claim. For purposes of applying art, the claims were treated as requiring the existence of solid Zr, Hf, and/or Y (the claimed modifying elements).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-2 and 4-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Warnes et al. (U.S. Patent 5,989,733, hereafter '733) in view of Basta et al. (U.S. Patent 5,261,963, hereafter '963).

Claims 1, 4-5, 10-11: '733 teaches a CVD method

providing an article with a surface (col. 5, lines 46-67);

preparing a coating source (col. 6, lines 5-37) which comprises aluminum trichloride (i.e., an aluminum halide) (col. 6, lines 6-9), hafnium tetrachloride (i.e., a chloride of a modifying element) (col. 6, line 10), zirconium tetrachloride (i.e., a chloride of a modifying element) (col. 6, lines 10), and argon (i.e., a carrier gas (col. 6, lines 9-10);

contacting the coating source to the article (col. 6, lines 32-34); and

heating the coating source and the article to a coating temperature of 1080 °C (1976 °F) (col. 6, lines 5-6) for a period of time to permit aluminum and the modifying element(s) to coat onto the surface of the article (col. 6, lines 32-34).

'733 does not explicitly teach the use of a fluoride or iodide of the modifying element. '733 teaches providing the metal chloride CVD precursors by flowing HCl over/through samples of the metals (col. 6, lines 12-32). However, '963 (which is referenced in '733, col. 5, lines 46-

53) teaches that instead of forming metal chlorides as CVD precursors by such a method, metal fluorides, including those of aluminum, hafnium, and zirconium, may be formed as CVD precursors by the analogous method of flowing HF over the metal sources (col. 4, lines 21-48; col. 9, lines 19-32). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided the metal fluorides of '963 in place of the metal chlorides of '733 with the expectation of similar results and with a reasonable expectation of success.

Claim 2: The article is provided with a platinum-enriched surface region (col. 5, lines 53-56).

Claims 6-7: The source may broadly include the solid aluminum, hafnium, and zirconium over/through which the HCl or HF is flowed ('733, col. 6, lines 12-32).

Claim 8: The hafnium or zirconium fluoride is initially provided in the immediate vicinity of the hafnium/zirconium bed(s). These beds do not appear to be on the substrate, and therefore are separated from the substrate.

Claim 9: The precursor then flows to (i.e., is applied to) the substrate.

6. Claims 3 and 12-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Warnes '733 in view of Basta '963 as applied to claim 1 above, and further in view of Basta et al. (U.S. Patent 5,658,614, hereafter '614).

Claims 3 and 12: '733 and '963 teaches the application of platinum aluminide coatings, as described above. They are applied to nickel-base superalloys ('733, col. 3, lines 43-47) and are of interest in the application to turbine blades ('733, col. 1, lines 59-67). They do not explicitly teach that the substrate is an airfoil.

'614 (which is specifically mentioned in '733, col. 2, lines 14-19 teaches that airfoils benefit from CVD applied platinum aluminide coatings (col. 3, lines 25-37). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the method of '733 and '963 on an airfoil as the particular turbine engine component to receive the coating because '614 teaches that airfoils benefit from such coatings.

Claims 13: The article is provided with a platinum-enriched surface region (col. 5, lines 53-56).

Claims 14-16: The references fairly teach zirconium tetrafluoride, hafnium tetrafluoride, and aluminum trifluoride, as described regarding claims 1, 4, and 5, above.

Claims 17-18: The source may broadly include the solid aluminum, hafnium, and zirconium over/through which the HCl or HF is flowed ('733, col. 6, lines 12-32).

Claim 19: The hafnium or zirconium fluoride is initially provided in the immediate vicinity of the hafnium/zirconium bed(s). These beds do not appear to be on the substrate, and therefore are separated from the substrate.

Claim 20: The precursor then flows to (i.e., is applied to) the substrate.

Claim 16: '733 does not explicitly teach a ratio of AlF_3 to ZrF_4 of between 1.4 and 3 (which corresponds to a molar ratio of Al to Zr of 2.7-6). However, it is the Examiner's position that the range of the molar ratio of Al to Zr overlaps that effectively claimed by Applicant, as described in greater detail as follows:

The Example of '733, col. 6, lines 5-37 provides Hf as the major modifying element. It is clear that this amount of Hf satisfies the desired weight ratio of the abstract (0.01-8 wt. %). It is also clear from the abstract Zr may be supplied in the same weight amount of 0.01-8 wt%. However, because Hf (MW=178.5) has a molecular weight approximately twice that of Zr (MW=91.2), approximately twice as many moles will be necessary to provide the same weight. In the Example of '733, col. 6, lines 5-37, the molar ratio approximately corresponds to the volumetric ratio of the gases (assuming the gases behave as ideal gases). The flow is 4% of a mixture that is >90% aluminum trichloride (i.e., about 3.6 vol. % and therefore about 3.6 mol % $AlCl_3$) and about 1.5 vol % (and therefore mol %) $HfCl_4$. As stated above, it would take approximately twice as many moles of $ZrCl_4$ (or ZrF_4) to produce the same weight of Zr as Hf in the coating. Thus, 3.0 vol. % $ZrCl_4$ or ZrF_4 would have been necessary to produce the same weight. Therefore, the molar ratio of Al/Zr for this embodiment is approximately 3.6/3.0=1.2.

The literal teaching of col. 6, lines 5-37 suggests a much higher ratio (3.6 vol. % $AlCl_3$/(1% (col. 6, lines 28-32) of the 1.5 vol. % $HfCl_4/ZrCl_4$ mixture)=3.6/0.015=240. Therefore, it is the Examiner's position that '733 fairly suggests molar ratios of Al/Zr covering at least the range 1.2 to 240. The subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected the overlapping

portion of the range disclosed by the reference because overlapping ranges have been held to be a *prima facie* case of obviousness, see *In re Malagari*, 182 U.S.P.Q. 549.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Cleveland whose telephone number is (703) 308-2331. The examiner can normally be reached on 9-5:30 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (703) 308-2333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 306-3186 for regular communications and (703) 306-3186 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

MBC

MBC
April 10, 2002

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